

# NAVAL AVIATION MAINTENANCE INJURIES

By

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## **DATA**

- Web-Enabled Safety System (WESS) mishap and hazard report data from 1 October 2004 through 31 March 2014.
- Naval Air System Command (NAVAIR) Decision Knowledge Programming for Logistics Analysis and Technical Evaluation (DECKPLATE) maintenance man-hour and flight hour data.
- Navy Enlisted Rating Inventory from Navy Personnel Command Code 32

## **METHODOLOGY**

In order to perform the analysis of aviation maintenance injuries, data extracted from WESS included:

- Date of Mishap/Hazard
- Reporting Command of the Mishap/Hazard
- Severity Classification of the Event
- Type/Model/Series of the Involved Aircraft
- Injury Classification of the Injured Person
- BLS (Bureau of Labor Standards) Injury Type of the Injured Person
- BLS Injured Body Part
- Injured Civilian's Grade/Job Title
- Injured Service Member's Rank, Rate, MOS, Service and Service Status

After the data was extracted, several issues with the data were discovered that affected the analysis. The issue that affected the data more than any other involved the database in which the event was submitted. Per OPNAVINST 3750.6S, the scope of the Naval Aviation Safety Management System includes manned aircraft and UAV/UAS design, research, development, test, evaluation, procurement, modification, maintenance, servicing, operations, support equipment, facilities, supplies, and weapons. WESS contains separate databases for the storage of aviation and non-aviation (consolidated) data. Of the 1367 aviation maintenance injury events detailed in this study, 997 were submitted into the consolidated WESS database instead of the aviation database. The aviation database contains data fields that are designed exclusively for the unique environment in which aircraft operate. The consolidated database does not possess or need many of the data fields that are present in the aviation database. This includes the data fields needed to extract an aviation maintenance injury distinct from a non-aviation maintenance injury. Missing from the consolidated database are Type/Model/Series (T/M/S), custodian of the aircraft, location of the aircraft (afloat/ashore) and aviation cause factors/HFACS. The T/M/S can be identified by the reporting command; however, some events were reported by the involved ship or air station making T/M/S identification impossible. For this reason an injury rate by T/M/S could not be generated accurately.

Another major issue that hindered the extraction from the consolidated database concerned the fact that there is no single field that identifies an incident as an aviation maintenance injury. Events had to be extracted from consolidated by using codes that were designed for non-aviation events. This generated many events that did not fit the criteria for an aviation maintenance injury and the unwanted events had to be evaluated and discarded manually through a reading of the narratives. Although it is believed that most of the injuries were extracted, there is no

guarantee that all aviation maintenance injuries that were contained in the consolidated database were found using this manual method of extraction.

Other data issues encountered included the lack of Marine MOS in the aviation database. This precluded the possibility of calculating Marine injury rate by MOS. Additionally the Civilian Grade/Job Title was not coded in any event. Also, the BLS Body Part and Injury Type values were missing from most of the events. Body Part had to be filled in manually from the narrative if the body part was sufficiently described. The Injury Type also had to be filled in manually from the narrative. Finally, the feed from DECKPLATE that contained the maintenance man-hour data is current only through March 2014. All data for FY14 was calculated using data from October through March.

## ANALYSIS

### AVIATION MAINTENANCE INJURY RATE

Table 1 displays all of the reported aviation maintenance injuries from FY 2005 through 31 March 2014. The abbreviations in the table headers are PTD – Permanent Total Disability, PPD – Permanent Partial Disability, >1 LWD – Greater Than 1 Lost Work Day and LLRD – Light/Limited or Restricted Duty. Most are relatively minor injuries. Of the 1367 reported injuries, only 24 resulted in a PPD or greater. Of the 24, there were only 3 fatalities. Note that there were 31 events listed as no injury. Although they were coded as no injury in the database, a careful reading of the narrative showed that there was in fact an injury sustained in that particular incident. There was not enough information in the narrative to positively ascertain the severity of the injury, and most were electric shocks. Tables 2 and 3 show the separate Navy and Marine Corps totals based on the service of the injured person.

AVIATION MAINTENANCE INJURIES									
FY	FATAL	PTD	PPD	>1 LWD	LLRD	OTHER/NO LOST TIME	FIRST AID	NO INJURY	Grand Total
2005		1	3	47	46	85	71	1	254
2006			4	46	77	77	34	1	239
2007			4	59	39	40	42	2	186
2008			2	39	11	10	40		102
2009	1		2	37	28	19	41	2	130
2010				37	47	24	27	2	137
2011	1		2	21	39	16	10	3	92
2012			2	23	28	19	17	8	97
2013	1		1	19	27	18	4	5	75
2014				12	15	13	8	7	55
<b>Grand Total</b>	<b>3</b>	<b>1</b>	<b>20</b>	<b>340</b>	<b>357</b>	<b>321</b>	<b>294</b>	<b>31</b>	<b>1367</b>

**Table 1: Naval Aviation Maintenance Injuries (FY05 – 31 March 2014)**

NAVY AVIATION MAINTENANCE INJURIES									
FY	FATAL	PTD	PPD	>1 LWD	LLRD	OTHER/NO LOST TIME	FIRST AID	NO INJURY	Grand Total
2005		1	2	35	24	58	47	1	168
2006			2	36	59	52	22	1	172
2007			3	45	30	33	40	2	153
2008			2	25	9	8	38		82
2009	1		1	31	18	17	29	2	99
2010				30	30	17	23	2	102
2011			2	20	35	13	9	2	81
2012				21	26	19	15	6	87
2013	1			17	23	17	4	4	66
2014				4	11	9	7	7	38
<b>Grand Total</b>	<b>2</b>	<b>1</b>	<b>12</b>	<b>264</b>	<b>265</b>	<b>243</b>	<b>234</b>	<b>27</b>	<b>1048</b>

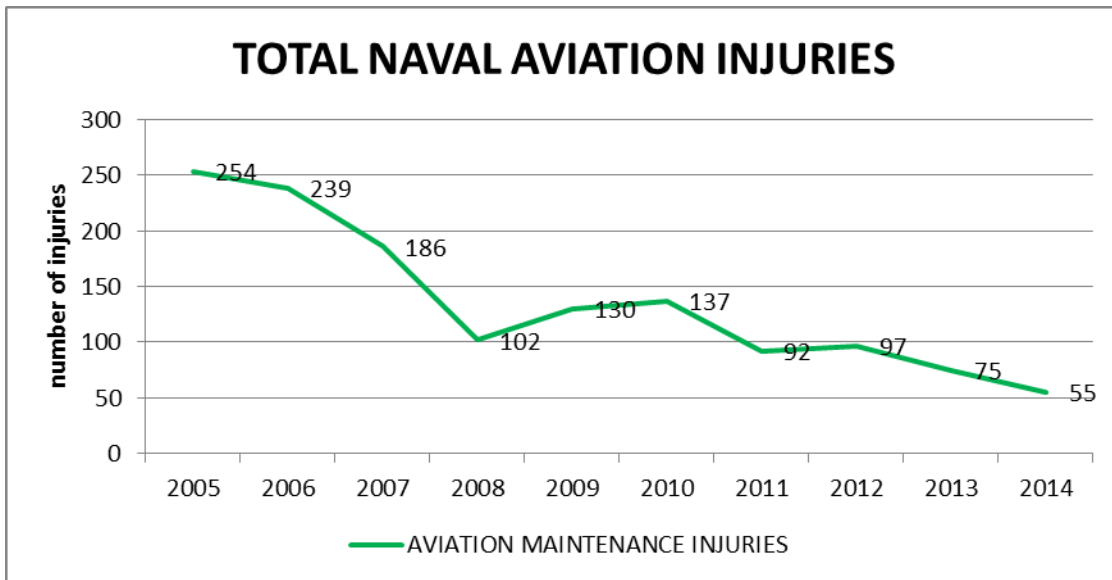
**Table 2: Navy Aviation Maintenance Injuries (FY05 – 31 March 2014)**

MARINE AVIATION MAINTENANCE INJURIES									
FY	FATAL	PTD	PPD	>1 LWD	LLRD	OTHER/NO LOST TIME	FIRST AID	NO INJURY	Grand Total
2005			1	12	22	26	23		84
2006			2	10	18	25	12		67
2007			1	14	9	7	2		33
2008				14	2	2	2		20
2009			1	6	10	2	5		24
2010				6	16	7	4		33
2011	1			1	4	3			9
2012			2	2	2		2	2	10
2013			1	2	4			1	8
2014				7		1	1		9
<b>Grand Total</b>	<b>1</b>		<b>8</b>	<b>74</b>	<b>87</b>	<b>73</b>	<b>51</b>	<b>3</b>	<b>297</b>

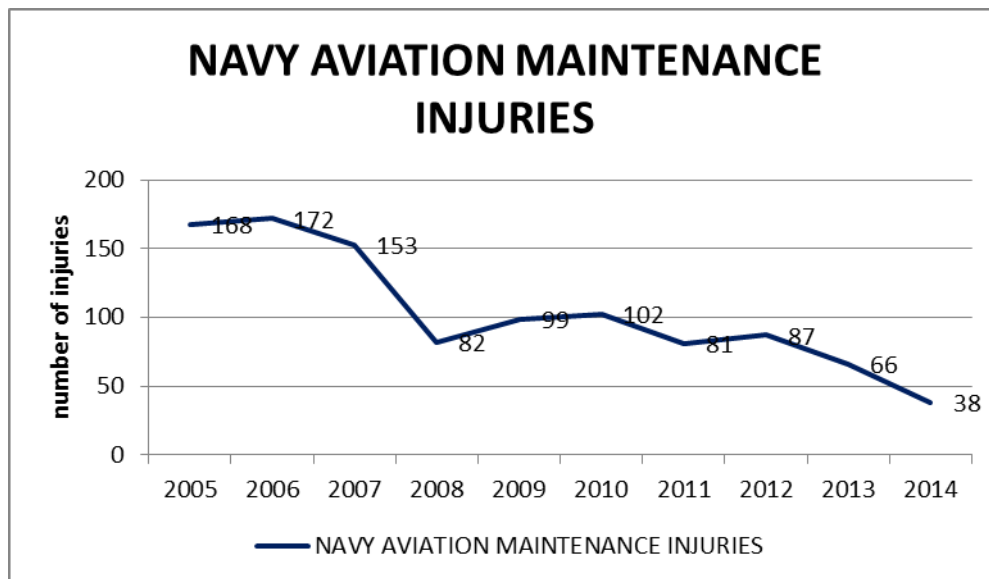
**Table 3: Marine Corps Aviation Maintenance Injuries (FY05 – 31 March 2014)**

Not included in the separate Navy/Marine Corps totals were 6 civilian non-government affiliated injured persons, 6 from an unidentified government agency, 2 from the Defense Logistics Agency, 2 from the Air Force and 6 unknown.

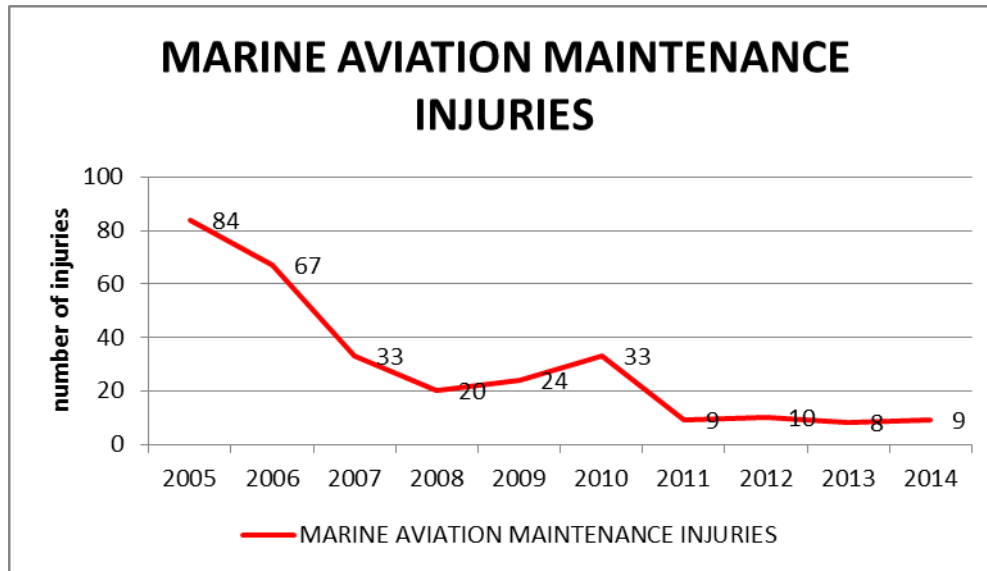
It is clear from grand total section in each fiscal year that the number of aviation maintenance injuries has decreased since 2005. Figure numbers 1 – 3 display this visually.



**Figure 1: Naval Aviation Maintenance Injuries (FY05 – 31 March 2014)**



**Figure 2: Navy Aviation Maintenance Injuries (FY05 – 31 March 2014)**



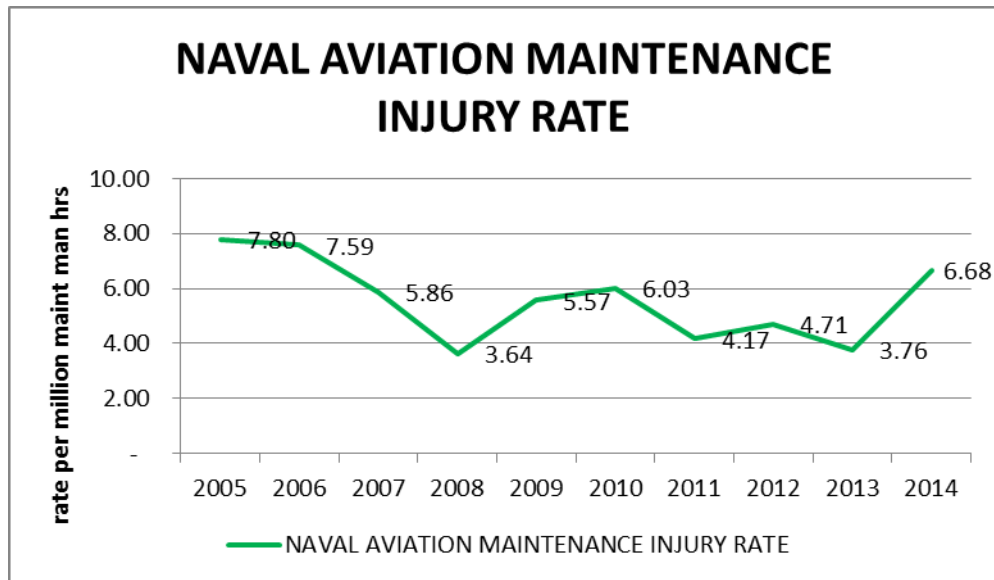
**Figure 3: Marine Corps Aviation Maintenance Injuries (FY05 – 31 March 2014)**

The numbers by year are only a portion of the story. Table 4 displays the maintenance man-hours for each service.

AVIATION MAINTENANCE MAN HOURS			
FY	MARINE	NAVY	Grand Total
2005	9,363,735.20	23,197,107.80	32,560,843.00
2006	9,223,040.50	22,285,960.10	31,509,000.60
2007	9,480,532.10	22,245,583.30	31,726,115.40
2008	7,645,922.10	20,404,634.70	28,050,556.80
2009	6,168,878.50	17,170,973.80	23,339,852.30
2010	5,977,387.50	16,757,036.70	22,734,424.20
2011	6,415,988.20	15,665,173.90	22,081,162.10
2012	6,477,776.70	14,095,394.60	20,573,171.30
2013	6,468,377.30	13,472,763.00	19,941,140.30
2014	2,719,203.10	5,512,278.40	8,231,481.50
<b>Grand Total</b>	<b>69,940,841.20</b>	<b>170,806,906.30</b>	<b>240,747,747.50</b>

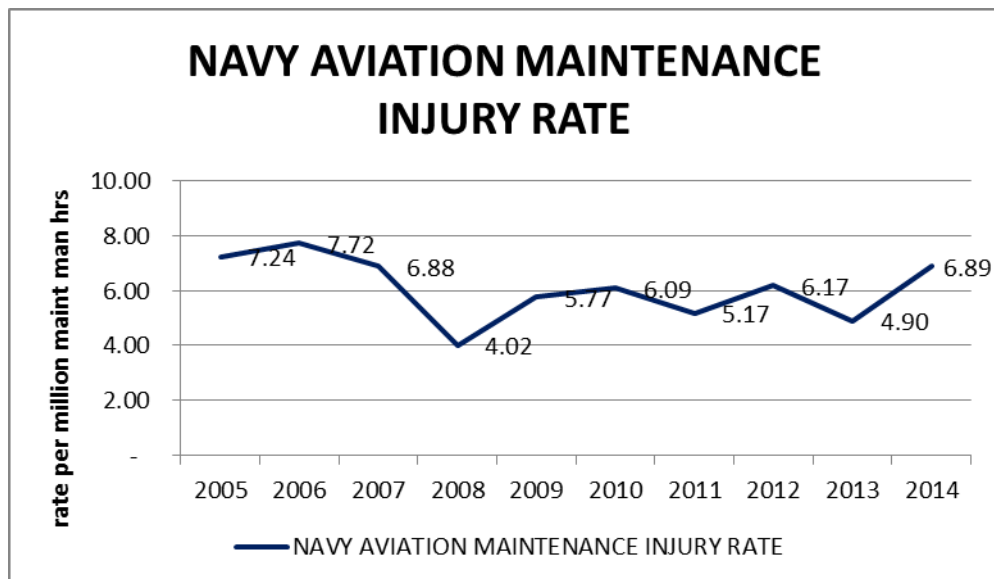
**Table 4: Naval Aviation Maintenance Man-Hours (FY05 – 31 March 2014)**

It can be seen that the maintenance man-hours have also decreased since FY05. Figures 4 – 6 display the injury rate per 1 million maintenance man-hours per year.



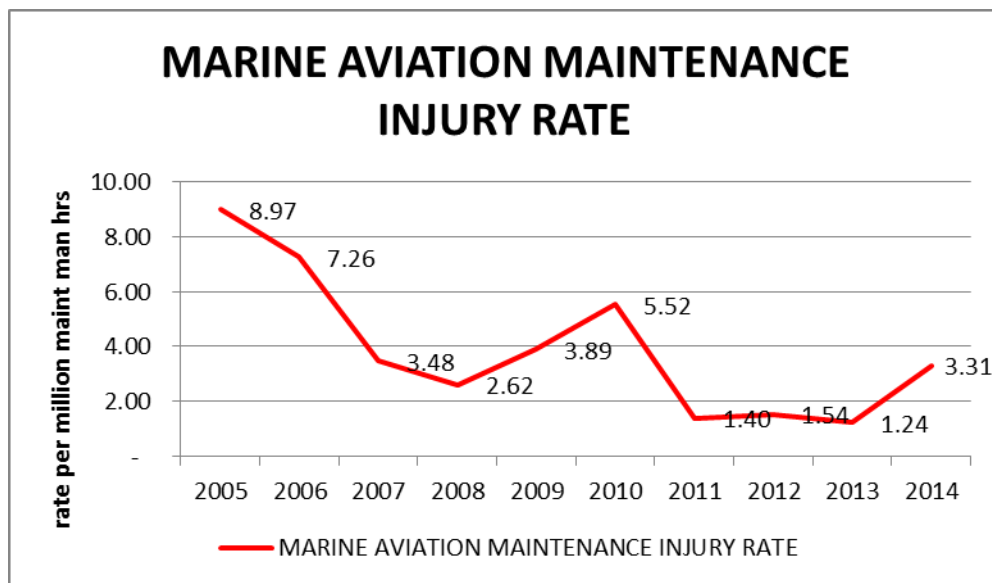
**Figure 4: Naval Aviation Maintenance Injury Rate (FY05 – 31 March 2014)**

Overall, there was a statistically significant decrease in the injury rate in 2008 when compared to 2005 – 2007. From 2008 through 2013 there was no statistically significant change in the injury rate. In 2014, there is a statistically significant increase in the injury rate when compared to 2008 – 2013. Figure 5 displays the Navy rate.



**Figure 5: Navy Aviation Maintenance Injury Rate (FY05 – 31 March 2014)**

Navy injury rate displays the same statistically significant decrease in 2008. The Navy rate also increases in 2014, but the increase is not statistically significant when compared to 2008 – 2013. Figure 6 shows the Marine Corps injury rate.



**Figure 6: Marine Corps Aviation Maintenance Injury Rate (FY05 – 31 March 2014)**

The Marine Corps injury rate also shows the same decrease from 2005 through 2008. Although the injury rate rises and falls from 2009 through 2014, statistically, there is no change in the rate during those years. It should be noted however that 2014 is statistically significantly higher than the 2011 – 2013 rate.

Overall from 2005 – 31 March 2014, the Marine Corps aviation maintenance injury rate (4.25 per million man-hours per year) is statistically significantly lower than the Navy (6.14 per million man-hours per year).

The service status of the injured persons reveals differences between the Navy and Marine Corps. Tables 5 and 6 show each service's injured persons by service status. 97% of injured marines were active duty maintainers compared to 83% of Navy maintainers. 1% of the marines were civilians while 15% of the sailors were civilians.

FY	NUMBER OF INJURIES				
	MARINE				
	ACTIVE	FEDERAL APPR CIVILIAN	RESERVE - ACTIVE	RESERVE - READY	UNKNOWN
2005	84				
2006	66	1			
2007	28		2		3
2008	20				
2009	23			1	
2010	33				
2011	9				
2012	10				
2013	7	1			
2014	9				
<b>Grand Total</b>	<b>289</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>3</b>

**Table 5: Marine Corps Injured Persons By Service Status (FY 2005 – 31 March 2014)**

FY	NUMBER OF INJURIES				
	NAVY				
	ACTIVE	FEDERAL APPR CIVILIAN	FEDERAL NON-APPR CIVILIAN	RESERVE - ACTIVE	RESERVE - READY
2005	148	16		4	
2006	159	6	5	2	
2007	143	6	3	1	
2008	74	4		3	1
2009	90	7		2	
2010	77	24		1	
2011	53	25		3	
2012	61	25		1	
2013	39	24		3	
2014	31	7			
<b>Grand Total</b>	<b>875</b>	<b>144</b>	<b>8</b>	<b>20</b>	<b>1</b>

**Table 6: Navy Injured Persons By Service Status (FY 2005 – 31 March 2014)**

Table 7 shows a breakdown of the severity of injury by service status. All of the most severe injuries (Permanent Partial Disability or more severe) occurred to active duty persons.

INJURY SEVERITY	SERVICE STATUS						Grand Total
	ACTIVE	FEDERAL APPR CIVILIAN	FEDERAL NON-APPR CIVILIAN	RESERVE - ACTIVE	RESERVE - READY	UNKNOWN	
FATAL	3						3
PTD	1						1
PPD	20						20
>1 LWD	279	49	1	4	2	3	338
LLRD	280	62	6	4			352
OTHER/NO LOST TIME	281	28		7			316
FIRST AID	270	7	1	7			285
NO INJURY	30						30
<b>Grand Total</b>	<b>1164</b>	<b>146</b>	<b>8</b>	<b>22</b>	<b>2</b>	<b>3</b>	<b>1345</b>

**Table 7: Navy/Marine Corps Injury Severity By Service Status (FY 2005 – 31 March 2014)**

Table 8 lists the number of injuries and injury rate per 100,000 personnel per year for each aviation maintenance rating. Please note that 15% of the Navy active, reserve-active and reserve-ready injuries did not have an enlisted rating listing in the database.

Aviation Structural Mechanic (Safety Equipment) had the highest injury rate. Next highest were Aviation Machinist's Mate, Aviation Structural Mechanic and Aviation Electrician's Mate.

Enlisted Rating	No of Injuries	Rate per 100,000 personnel per year
AVIATION STRUCTURAL MECHANIC (SAFETY EQUIPMENT)	47	102.78
AVIATION MACHINIST'S MATE	176	92.14
AVIATION STRUCTURAL MECHANIC	191	82.62
AVIATION ELECTRICIAN'S MATE	107	76.06
AVIATION ELECTRONICS TECHNICIAN	109	43.07
AVIATION ORDNANCEMAN	83	33.45
AVIATION MAINTENANCE ADMINISTRATIONMAN	7	7.72
AVIATION BOATSWAIN'S MATE (LAUNCHING AND RECOVERY EQUIPMENT)	4	4.62
AVIATION BOATSWAIN'S MATE (HANDLING)	4	2.52
AVIATION SUPPORT EQUIPMENTMAN	1	1.54
AVIATION BOATSWAIN'S MATE (FUELS)	0	0.00

**Table 8: Navy Injury Rate By Enlisted Rating (FY 2005 – 31 March 2014)**

In order to breakdown aviation maintenance injuries in greater detail, each injury was assigned an injury type that describes the specific action that caused the injury. Since many of the BLS Injury Type data fields were not coded, the injury type list that was used is shown below in table 9 along with the number of times the particular injury occurred.

TYPE OF INJURY	MARINE	NAVY	Grand Total
FALL	57	178	235
WALKED INTO AIRCRAFT COMPONENT	35	148	183
STRUCK BY AIRCRAFT PART	40	116	156
STRUCK BODY PART ON AIRCRAFT	44	96	140
ELECTRIC SHOCK	10	97	107
HAZMAT EXPOSURE	26	81	107
STRUCK BY TOOL	23	83	106
MUSCLE STRAIN	13	82	95
LACERATION	10	26	36
DROPPED MER/ORDNANCE/TANK	5	28	33
JET BLAST/ROTOR WASH	5	27	32
CRUNCHED BY PANEL/BAY/CANOPY	5	19	24
OBJECT IN EYE	7	16	23
BURN	6	12	18
STRUCK BY MOVING AIRCRAFT	2	15	17
AMMUNITION DISCHARGE		1	1
CADS/FLARES	3	6	9
HIT BY WAVE		2	2
INSECT BITE		2	2
LIGHTNING STRIKE		1	1
SMOKE INHALATION		1	1
OTHER	6	11	17
<b>Grand Total</b>	<b>297</b>	<b>1048</b>	<b>1345</b>

**Table 9: Naval Aviation Maintenance Injuries By Injury Type (FY05 – 31 March 2014)**

While most are self-explanatory, a brief explanation of five of the categories is required.

Walked Into Aircraft Component – Examples include a person walking into a horizontal stabilizer or standing up and hitting one's head on a landing gear door.

Struck By Aircraft Part – This involves a person being injured by a moving aircraft part. An example would be getting struck by a ram air turbine blade or a tail rotor.

Struck Body Part On Aircraft – This involves a person being injured by a stationary aircraft part. An example would be hitting one's hand on the fuselage while working.

Struck By Tool – This involved a person being injured by the tool as opposed to the aircraft.

Laceration – This could involve any of the four categories described above. However the narrative was not specific enough to determine what caused the injury.

For a complete breakdown of each injury type to include trends by FY, enlisted rating, involved aircraft component and body part, see Appendices A – J.

## AVIATION MAINTENANCE INJURY COST

Table 10 displays the cost that aviation maintenance injuries have incurred on the Navy and Marine Corps. The cost was extracted from WESS and was calculated by WESS from the injury cost table from OPNAVINST 5102.1D. The cost table in the 5102.1D was last updated in 1988; however this is still the official source for Navy/Marine Corps injury cost.

FY	FATAL	PTD	PPD	>1 LWD	LLRD	OTHER/NO LOST TIME	FIRST AID TREATMENT ONLY	NO INJURY	Grand Total
2005		\$500,000	\$345,000	\$202,661	\$73,231	\$9,626	\$0	\$4,920	\$1,135,438
2006			\$460,000	\$135,755	\$120,961	\$49,883	\$0	\$6,480	\$773,079
2007			\$460,000	\$89,817	\$51,600	\$2,386	\$5,250	\$960	\$610,013
2008			\$230,000	\$73,466	\$7,560	\$480	\$19,125	\$960	\$331,591
2009	\$125,000		\$230,000	\$212,287	\$63,600	\$11,280	\$0	\$7,080	\$649,247
2010				\$123,866	\$78,706	\$5,040	\$0	\$1,800	\$209,412
2011	\$270,000		\$230,000	\$197,580	\$59,311	\$360	\$0	\$0	\$757,251
2012			\$230,000	\$217,938	\$65,400	\$1,800		\$3,600	\$518,738
2013	\$1,100,000		\$115,000	\$147,456	\$55,935	\$0		\$0	\$1,418,391
2014				\$77,755	\$16,560	\$0		\$0	\$94,315
<b>Grand Total</b>	<b>\$1,495,000</b>	<b>\$500,000</b>	<b>\$2,300,000</b>	<b>\$1,478,581</b>	<b>\$592,864</b>	<b>\$80,855</b>	<b>\$24,375</b>	<b>\$25,800</b>	<b>\$6,497,475</b>

**Table 10: Naval Aviation Maintenance Injury Cost (FY05 – 31 March 2014)**

## AVIATION MAINTENANCE INJURY TOTAL LOST TIME

Table 11 displays the total amount of lost time in days that occurred as a result of aviation maintenance injury.

LOST TIME TOTAL			
FY	LWD	LLRD	HOSP
2005	485	1131	138
2006	246	1476	44
2007	160	552	85
2008	102	88	52
2009	322	944	0
2010	144	1134	13
2011	553	945	80
2012	477	1170	50
2013	304	708	6
2014	150	295	5
<b>Grand Total</b>	<b>2943</b>	<b>8443</b>	<b>473</b>

**Table 11: Naval Aviation Maintenance Injury Lost Time (FY05 – 31 March 2014)**

## **CONCLUSIONS**

- The aviation maintenance injury rate decreased in 2008 when compared to 2005. From 2008 through 2013 there has not been a statistically significant increase in the injury rate. 2014 may possibly have an increase in the injury rate based on the first six months of data. The injury rate should be revisited once the fiscal year has concluded.
- Falls are the leading cause of aviation maintenance injury. 19% of Marine Corps injuries and 17% of Navy injuries were the result of a fall.
- Although specific cause factors and HFACS were not available, from the narratives it appears that lack of awareness around the aircraft is a contributor to injuries. 40% of Marine Corps and 34% of Navy injuries were the result of either walking into an aircraft, or coming into contact with an aircraft while performing maintenance.

## **RECOMMENDATIONS**

- Continue to emphasize fall protection and look for technology/methods to prevent falls from aircraft.
- Continue to stress the need to properly wear Personal Protective Equipment (PPE). Many of the injuries that resulted from contacting an aircraft component could have been prevented or minimized if proper PPE were worn.
- Provide training to Aviation Safety Officers, Ground Safety Officers and Naval Safety Center Quality Assurance personnel on the criteria to report a mishap under OPNAVINST 3750.6S or OPNAVINST 5102.1D.

## APPENDIX A: INJURY TYPE BY ENLISTED RATING (FY05 – 31 MARCH 2014)

Falls are a major contributor to injury for almost every enlisted rating. For ratings that sustained greater than 12 injuries, falls were the leading cause except for Ordnancemen (MERS/Drop Tanks/Ordnance) and Electricians (Electric Shock).

AVIATION STRUCTURAL MECHANIC	
TYPE OF INJURY	NUMBER OF INJURIES
FALL	40
WALKED INTO AIRCRAFT COMPONENT	32
STRUCK BY AIRCRAFT PART	26
HAZMAT EXPOSURE	22
STRUCK BODY PART ON AIRCRAFT	17
STRUCK BY TOOL	15
MUSCLE STRAIN	8
ELECTRIC SHOCK	6
OBJECT IN EYE	5
CRUNCHED BY PANEL/BAY/CANOPY	4
JET BLAST/ROTOR WASH	4
STRUCK BY MOVING AIRCRAFT	3
LACERATION	3
BURN	2
DROPPED MER/ORDNANCE/TANK	2
OTHER	1
LIGHTNING STRIKE	1
<b>Grand Total</b>	<b>191</b>

**Table A-1: AM Injury Type**

AVIATION MACHINIST'S MATE	
TYPE OF INJURY	NUMBER OF INJURIES
FALL	37
STRUCK BODY PART ON AIRCRAFT	26
WALKED INTO AIRCRAFT COMPONENT	21
STRUCK BY TOOL	20
HAZMAT EXPOSURE	20
STRUCK BY AIRCRAFT PART	14
DROPPED MER/ORDNANCE/TANK	7
OBJECT IN EYE	5
MUSCLE STRAIN	5
JET BLAST/ROTOR WASH	5
CRUNCHED BY PANEL/BAY/CANOPY	4
ELECTRIC SHOCK	4
LACERATION	3
OTHER	2
BURN	2
INSECT BITE	1
<b>Grand Total</b>	<b>176</b>

**Table A-2: AD Injury Type**

AVIATION ELECTRONICS TECHNICIAN	
TYPE OF INJURY	NUMBER OF INJURIES
ELECTRIC SHOCK	34
WALKED INTO AIRCRAFT COMPONENT	14
FALL	13
HAZMAT EXPOSURE	10
STRUCK BODY PART ON AIRCRAFT	7
STRUCK BY AIRCRAFT PART	6
STRUCK BY TOOL	6
MUSCLE STRAIN	3
LACERATION	3
JET BLAST/ROTOR WASH	3
OTHER	2
CRUNCHED BY PANEL/BAY/CANOPY	2
HIT BY WAVE	1
OBJECT IN EYE	1
BURN	1
CADS/FLARES	1
DROPPED MER/ORDNANCE/TANK	1
SMOKE INHALATION	1
<b>Grand Total</b>	<b>109</b>

**Table A-3: AT Injury Type**

AVIATION ELECTRICIAN'S MATE	
TYPE OF INJURY	NUMBER OF INJURIES
ELECTRIC SHOCK	32
FALL	19
WALKED INTO AIRCRAFT COMPONENT	13
STRUCK BY AIRCRAFT PART	12
STRUCK BODY PART ON AIRCRAFT	6
LACERATION	5
STRUCK BY TOOL	4
MUSCLE STRAIN	4
BURN	3
JET BLAST/ROTOR WASH	3
OBJECT IN EYE	3
HAZMAT EXPOSURE	2
CRUNCHED BY PANEL/BAY/CANOPY	1
<b>Grand Total</b>	<b>107</b>

**Table A-4: AE Injury Type**

AVIATION ORDNANCEMAN	
TYPE OF INJURY	NUMBER OF INJURIES
DROPPED MER/ORDNANCE/TANK	16
WALKED INTO AIRCRAFT COMPONENT	13
MUSCLE STRAIN	10
STRUCK BY AIRCRAFT PART	10
STRUCK BY TOOL	9
STRUCK BODY PART ON AIRCRAFT	6
FALL	5
ELECTRIC SHOCK	3
JET BLAST/ROTOR WASH	3
STRUCK BY MOVING AIRCRAFT	2
HAZMAT EXPOSURE	2
OTHER	1
CRUNCHED BY PANEL/BAY/CANOPY	1
AMMUNITION DISCHARGE	1
LACERATION	1
<b>Grand Total</b>	<b>83</b>

**Table A-5: AO Injury Type**

AVIATION STRUCTURAL MECHANIC (SAFETY EQUIPMENT)	
TYPE OF INJURY	NUMBER OF INJURIES
FALL	9
WALKED INTO AIRCRAFT COMPONENT	7
STRUCK BY AIRCRAFT PART	7
ELECTRIC SHOCK	5
HAZMAT EXPOSURE	4
STRUCK BODY PART ON AIRCRAFT	3
CRUNCHED BY PANEL/BAY/CANOPY	2
MUSCLE STRAIN	2
JET BLAST/ROTOR WASH	2
STRUCK BY MOVING AIRCRAFT	1
OTHER	1
STRUCK BY TOOL	1
BURN	1
CADS/FLARES	1
LACERATION	1
<b>Grand Total</b>	<b>47</b>

**Table A-6: AME Injury**

AVIATION BOATSWAINS MATE SUMMARY	
TYPE OF INJURY	NUMBER OF INJURIES
WALKED INTO AIRCRAFT COMPONENT	4
STRUCK BY MOVING AIRCRAFT	2
STRUCK BY AIRCRAFT PART	2
JET BLAST/ROTOR WASH	2
HAZMAT EXPOSURE	1
ELECTRIC SHOCK	1
<b>Grand Total</b>	<b>12</b>

**Table A-7: AB/ABE/ABH Injury Type**

AVIATION MAINTENANCE ADMINISTRATIONMAN	
TYPE OF INJURY	NUMBER OF INJURIES
FALL	2
HAZMAT EXPOSURE	2
ELECTRIC SHOCK	2
BURN	1
<b>Grand Total</b>	<b>7</b>

**Table A-8: AZ Injury Type**

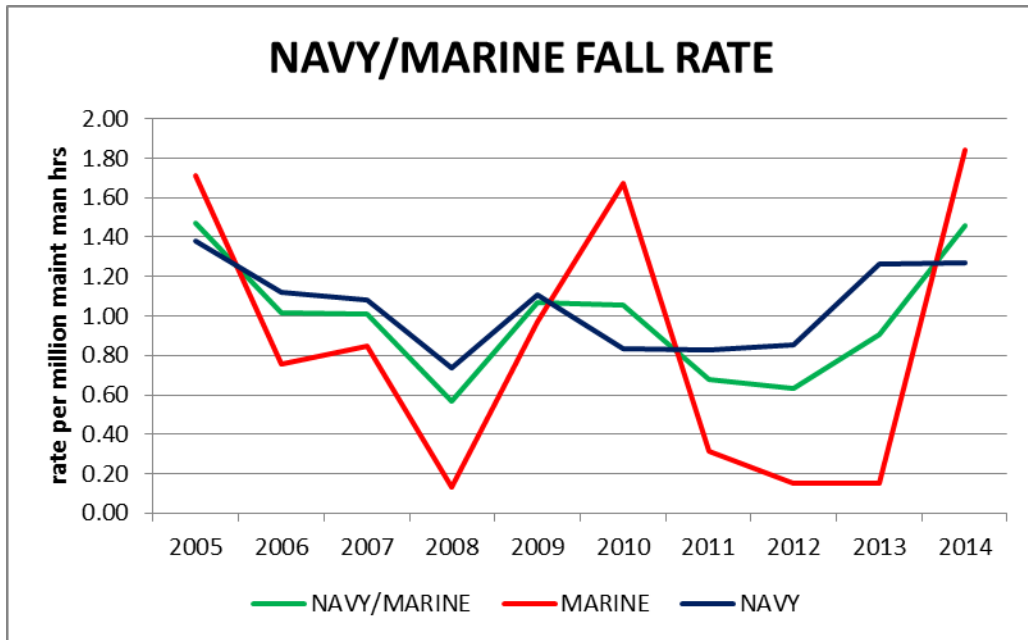
## APPENDIX B: FALLS

As shown in Table B-1, there have been 235 Navy/Marine falls resulting in injury during aviation maintenance.

FY	MARINE	NAVY	NAVY/MARINE
2005	16	32	48
2006	7	25	32
2007	8	24	32
2008	1	15	16
2009	6	19	25
2010	10	14	24
2011	2	13	15
2012	1	12	13
2013	1	17	18
2014	5	7	12
<b>Grand Total</b>	<b>57</b>	<b>178</b>	<b>235</b>

**Table B-1: Aviation Maintenance Injuries From Falls (Through 31 March 2014)**

Chart B-1 displays the fall injury rate per 1 million maintenance man-hours.



**Chart B-1: Aviation Maintenance Injuries From Fall Rate (Through 31 March 2014)**

It can be seen from Chart B-1 that the Marine Corps fall rate in 2014 has spiked to 2010 levels. Table B-2 gives an indication why the spike occurred.

T/M/S	DATE	SEVERITY	INJ_CLASSN	BODY PART	AIRCRAFT COMPONENT
KC-130T	3/12/2014	C	> 1 LWD	FOOT	WING
MV-22B	2/26/2014	C	> 1 LWD	HAND	STAND/LADDER
MV-22B	2/24/2014	H	> 1 LWD	UNK	UNKNOWN
MV-22B	12/3/2013	C	> 1 LWD	FINGER	FUSELAGE
MV-22B	12/2/2013	C	> 1 LWD	ARM	FUSELAGE

**Table B-2: FY14 Marine Corps Falls (Through 31 March 2014)**

There have been 4 falls from the MV-22B community in 2014. This account for 80% of the Marine Corps falls (4 of 5).

Table B-3 breaks falls down into 4 different types. Falls from elevation are the most common type of fall sustained during aviation maintenance.

TYPE OF FALL	NUMBER OF FALLS		
FALL FROM ELEVATION	46	145	191
SLIP/TRIP INSIDE AIRCRAFT	4	11	15
SLIP/TRIP ON TOP OF AIRCRAFT	2	7	9
SLIP/TRIP OUTSIDE AIRCRAFT	5	15	20
<b>Grand Total</b>	<b>57</b>	<b>178</b>	<b>235</b>

**Table B-3: Aviation Maintenance Injuries From Falls (Through 31 March 2014)**

Since falls from elevation account for 81% of the falls, the remaining charts provide more detail on this type of fall. Table B-4 list the number of falls from elevation by aircraft model and the aircraft component from which the individual fell.

AIRCRAFT COMPONENT	H-60	EA-6B	F-18	P-3	H-53	V-22	AH-1	E-2	C-2	C-130	AV-8B	E-6	S-3	F-14	C-26	C-37	H-46	P-8	UNK	Grand Total
FUSELAGE	21	6	4	3	8	5	3	3	1			1	1				1		7	64
STAND/LADDER	3	3	2	7	2	3		1		1			1	2	1			1	12	39
BOARDING LADDER		13	7	5			1		1			1				1			1	30
WING		1	9	3		1	1			1	3									19
UNKNOWN	5	3	4	2		1													1	16
CREW DOOR	4				3				1	1		1								10
SPONSON					3														2	5
ENGINE BAY DOOR	1	1																	1	3
ENGINE COWLING	1																		1	2
ENGINE STAND	1																			1
HORIZONTAL STABILIZER			1																	1
ENGINE																			1	1
AMMUNITION BAY DOOR							1													1
AIRCRAFT RAMP																			1	1
<b>Grand Total</b>	<b>36</b>	<b>27</b>	<b>27</b>	<b>20</b>	<b>16</b>	<b>10</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>27</b>	<b>193</b>

**Table B-4: Falls From Elevation By Aircraft And Aircraft Component (FY14 Through 31 March 2014)**

The fuselage was the most likely aircraft component from which to fall followed by a stand/ladder and a boarding ladder. The three aircraft that sustained the most falls from

elevation were H-60, EA-6B and F-18. Given the relatively small number of EA-6B airframes, sustaining the second highest amount of falls was surprising. From Table B-4, the main culprit in the EA-6B community was a fall from the boarding ladder. Falls from the H-60 were most likely to occur from the fuselage, while falls from the F-18 were likely to occur from the wing or boarding ladder.

Table B-5 lists the injured body parts from falls from elevation. Foot, leg, hand, back and arm were the highest injured body parts.

AIRCRAFT COMPONENT	FOOT	LEG	HAND	BACK	ARM	HEAD	FINGER	SHOULDER	BUTTOCKS	CHEST	HIP	GROIN	NECK	UNK	Grand Total
FUSELAGE	6	7	4	4	5	6	3	1	1	1				26	64
STAND/LADDER	4	1	6	4	4	2	2	1			1			14	39
BOARDING LADDER	2	7	1	3	2	1	1	2	1	1		1		8	30
WING	6	3		1	1	2								6	19
UNKNOWN	4		2	1	1			1					1	6	16
CREW DOOR		2	2	1										5	10
SPONSON		1	2	1			1								5
ENGINE BAY DOOR														3	3
ENGINE COWLING					1	1									2
ENGINE STAND														1	1
HORIZONTAL STABILIZER					1										1
ENGINE									1						1
AMMUNITION BAY DOOR	1														1
AIRCRAFT RAMP						1									1
<b>Grand Total</b>	<b>23</b>	<b>21</b>	<b>17</b>	<b>15</b>	<b>15</b>	<b>13</b>	<b>7</b>	<b>5</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>68</b>	<b>193</b>

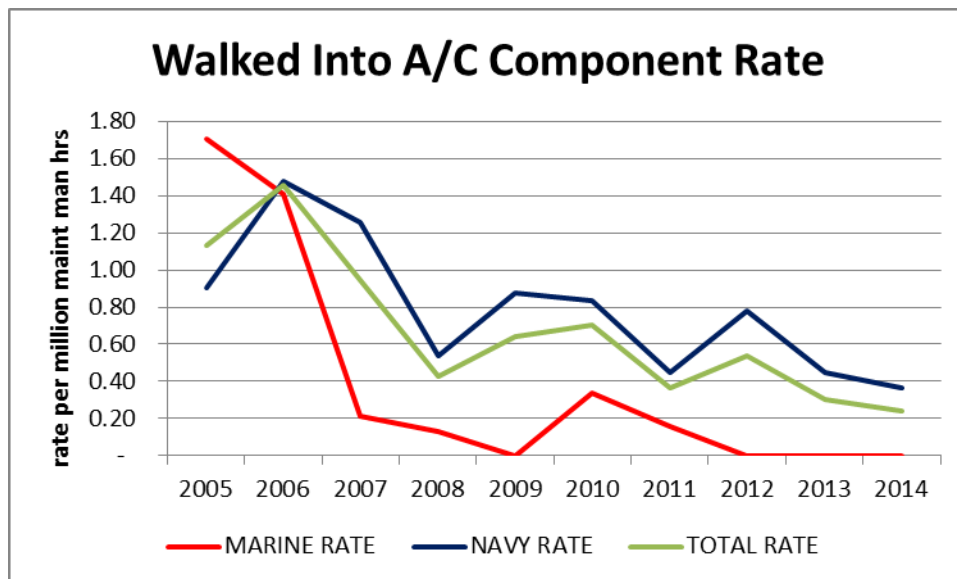
**Table B-5: Falls From Elevation By Injured Body Part And Aircraft Component  
(FY14 Through 31 March 2014)**

## APPENDIX C: WALKED INTO AIRCRAFT COMPONENT

Tables C-1 and C-2 show the number and rate of events where individuals walked into an aircraft component. The Marines have not sustained this type of injury since 2011.

FY	MARINE	NAVY	Grand Total
2005	16	21	37
2006	13	33	46
2007	2	28	30
2008	1	11	12
2009		15	15
2010	2	14	16
2011	1	7	8
2012		11	11
2013		6	6
2014		2	2
Grand Total	35	148	183

**Table C-1: Number of Injuries From Walking Into An Aircraft  
(Through 31 March 2014)**



**Table C-2: Rate of Injuries From Walking Into An Aircraft  
(Through 31 March 2014)**

Table C-3 displays the specific aircraft and aircraft component in which the individual walked.

AIRCRAFT COMPONENT	F-18	P-3	EA-6B	AV-8B	H-60	E-6	E-2	AH-1	P-8	C-2	F-14	H-53	S-3	C-130	V-22	UNK	Grand Total
FLAP	27	7	1			1	1									3	40
LANDING GEAR DOOR	4	2	4	1		1				2	1			1		3	19
UNKNOWN	6	3	1	1	3		1					1				1	17
HORIZONTAL STABILIZER	9		2	1												4	16
PYLON	6	2		4									1				13
ANTENNA	1			1		1		1	1							3	8
PANEL		3	2				1									2	8
WING	2		1													3	6
ENGINE COWLING						5										1	6
NOSE LANDING GEAR DOOR	1		1								1					2	5
TAIL	1				2											1	4
PROPELLER														1		2	3
ROTOR BLADE												1			1	1	3
NOSE LANDING GEAR									1							2	3
PITOT TUBE					1											2	3
ENGINE BAY DOOR	1		1													1	3
DROP TANK																2	2
ACCESS DOOR	2																2
TAIL ROTOR								1								1	2
FUEL TANK																2	2
BOMB RACK		1	1														2
ROTOR BLADE RESTRAINT					1												1
TAILHOOK										1							1
IFF DOOR													1				1
GUNNER'S STEP								1									1
COLD AIR NOZZLE				1													1
BOTTOM STROBE LIGHT		1															1
STABILIZATION BAR																1	1
VEN	1																1
ORDNANCE	1																1
VIBE ABSORBER					1												1
AIRCRAFT OVERHEAD																1	1
WEAPON	1																1
EXHAUST BLAST SHIELD				1													1
VORTEX GENERATOR		1															1
RAM AIR EXHAUST							1										1
WEEKLY DOOR											1						1
ROTODOME GEAR BOX							1										1
LANDING GEAR		1															1
HYDRAULIC PUMP									1								1
Grand Total	63	21	14	10	8	8	5	3	3	3	3	2	2	2	1	38	186

**Table C-3: Aircraft Components (Walked Into Aircraft From  
FY05 Through 31 March 2014)**

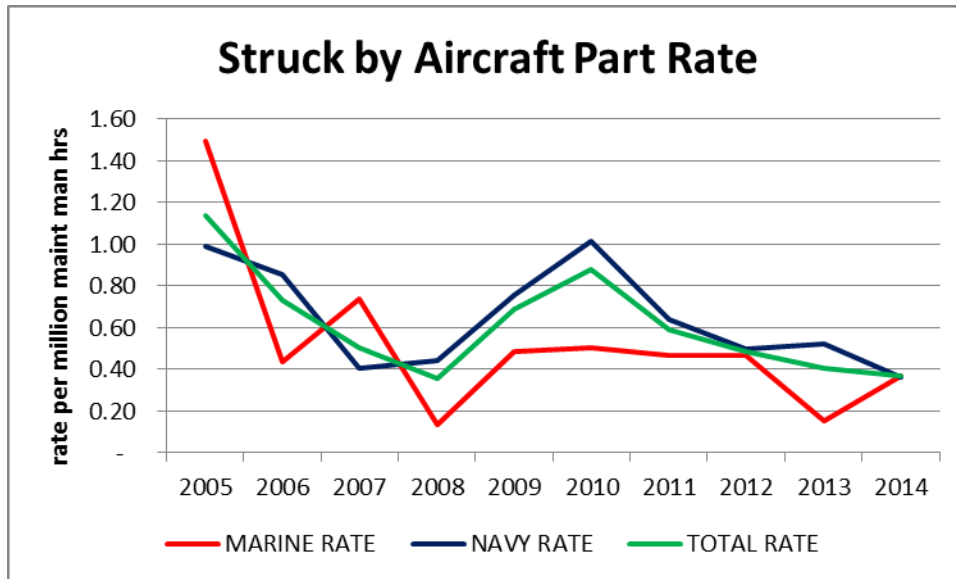
The F-18 had the highest number. The most common aircraft component was the flap followed by main landing gear door, horizontal stabilizer and pylons. 91% of the injuries for this type of event occurred to the head.

## APPENDIX D: STRUCK BY AIRCRAFT PART

Table D-1 displays the number of injuries from being struck by an aircraft part. Figure D-1 shows the rate of injury.

FY	MARINE	NAVY	Grand Total
2005	14	23	37
2006	4	19	23
2007	7	9	16
2008	1	9	10
2009	3	13	16
2010	3	17	20
2011	3	10	13
2012	3	7	10
2013	1	7	8
2014	1	2	3
Grand Total	40	116	156

**Table D-1: Struck By Aircraft Part Injuries (Through 31 March 2014)**



**Figure D-1: Struck By Aircraft Part Injuries (Through 31 March 2014)**

Table D-2 lists the T/M/S vs the aircraft component. Only the top 24 aircraft components were listed to save space. Boarding ladders and flaps from the F-18 and H-60 rotor blades had the three highest occurrences. Not listed are 74 other components that only struck and injured an individual one time.

AIRCRAFT COMPONENT	F-18	H-60	EA-6B	P-3	AH-1	H-53	V-22	AV-8B	E-6	F-14	P-8	C-2	C-130	T-34	S-3	C-9	T-45	H-46	UNK	Grand Total
BOARDING LADDER	5		1	3							1									10
FLAP	5			1			1					1								8
ROTOR BLADE		5																	1	6
PANEL	1		2				1												2	6
TAILHOOK	2		2							1										5
LANDING GEAR	2												1						1	4
CREW DOOR					1														2	3
HEAT EXCHANGER	1																		2	3
PROPELLOR DOME				2							1									3
GUN TURRET					3															3
FUEL TANK	2		1																	3
SPOILER	1							1												2
RAM AIR TURBINE BLADE			2																	2
TAIL ROTOR					1	1														2
NOSE LANDING GEAR	1																		1	2
ENGINE BAY DOOR	1		1																	2
BREAKER BAR			1																1	2
TAIL PYLON		2																		2
GENERATOR						1	1													2
LCFU RESERVOIR CAP	2																			2
CANOPY	1		1																	2
ORDNANCE	1									1										2
HORIZONTAL STABILIZER	2																			2

**Table D-2: Aircraft Components (Struck By Aircraft Part From FY05 Through 31 March 2014)**

Table D-3 displays the body parts that were injured from the same top 24 aircraft components. Fingers, heads and hands were the top three body parts.

AIRCRAFT COMPONENT	FINGER	HEAD	HAND	EYE	LEG	NECK	CHEST	BACK	ARM	FOOT	UNK	Grand Total
BOARDING LADDER	4	4	1	1								10
FLAP	3				1						4	8
ROTOR BLADE	1	3					1				1	6
PANEL		4	1		1							6
TAILHOOK	1		1		1		1				1	5
UNKNOWN	1	2									2	5
LANDING GEAR	2		1			1						4
CREW DOOR	1							1			1	3
HEAT EXCHANGER	3											3
PROPELLOR DOME	2	1										3
GUN TURRET			2						1			3
FUEL TANK	1		1						1			3
SPOILER		1									1	2
RAM AIR TURBINE BLADE			1	1								2
TAIL ROTOR	1	1										2
NOSE LANDING GEAR	1				1							2
ENGINE BAY DOOR						1				1		2
BREAKER BAR				1							1	2
TAIL PYLON	2											2
GENERATOR			2									2
LCFU RESERVOIR CAP		2										2
CANOPY			1								1	2
ORDNANCE	2											2
HORIZONTAL STABILIZER		1	1									2

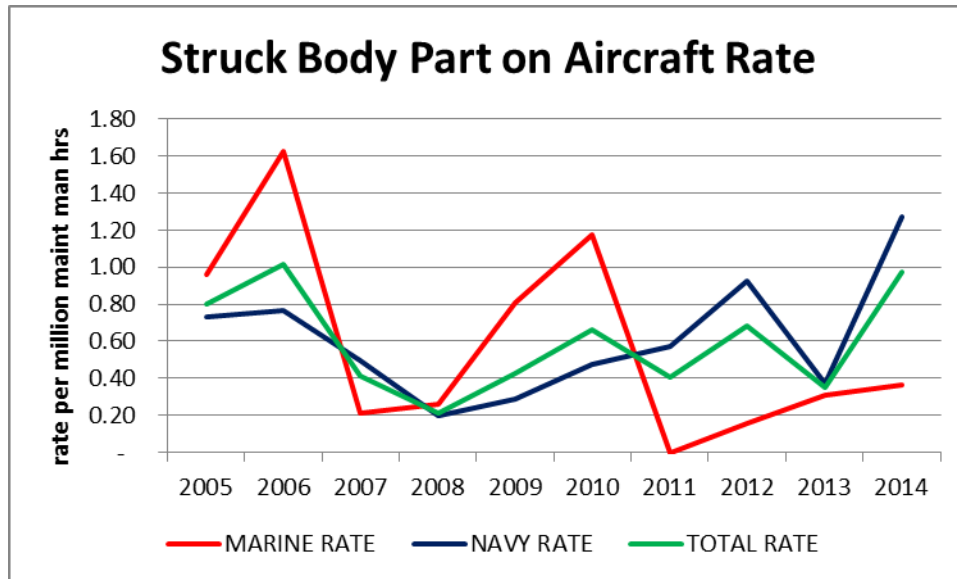
**Table D-3: Aircraft Components vs Body Parts (Struck By Aircraft Part From FY05 Through 31 March 2014)**

## APPENDIX E: STRUCK BODY PART ON AIRCRAFT

Table E-1 displays the number of injuries from being struck by an aircraft part. Figure E-1 shows the rate of injury. This is the only injury type in which the Marine injury rate since FY05 is higher than the Navy although the difference is not statistically significant.

FY	MARINE	NAVY	Grand Total
2005	9	17	26
2006	15	17	32
2007	2	11	13
2008	2	4	6
2009	5	5	10
2010	7	8	15
2011		9	9
2012	1	13	14
2013	2	5	7
2014	1	7	8
<b>Grand Total</b>	<b>44</b>	<b>96</b>	<b>140</b>

**Table E-1: Struck Body Part On Aircraft Injuries (Through 31 March 2014)**



**Figure E-1: Struck Body Part On Aircraft Injury Rate (Through 31 March 2014)**

Table E-2 lists the top 23 aircraft components for this injury type. To save space, 59 other components that only caused an injury once were not included.

AIRCRAFT COMPONENT	F-18	P-3	AH-1	H-53	H-60	EA-6B	E-6	S-3	V-22	P-8	AV-8B	C-130	E-2	C-2	UNK	Grand Total
PANEL	2	1		2			1		1						2	9
TURKEY FEATHER	5														1	6
BOARDING LADDER		3			1			1								5
ENGINE						1	1						1		2	5
FUEL CELL															5	5
VEN	4															4
ENGINE EXHAUST	1								1						2	4
HORIZONTAL STABILIZER								1			1				1	3
ROTOR HEAD			1						1						1	3
PYLON	2														1	3
NOSE LANDING GEAR		2														2
TAIL ROTOR			2													2
HEAT SHIELD						1					1					2
EJECTION SEAT						1					1					2
LANDING GEAR DOOR							1			1						2
ENGINE BAY DOOR	1					1										2
COTTER PIN			1			1										2
FLAP							1								1	2
FUSELAGE															2	2
BRACKET			1												1	2
CREW DOOR															2	2
FUEL TANK	1							1								2
GENERATOR		1													1	2

**Table E-2: Aircraft Component vs T/M/S (FY05 Though 31 March 2014)**

Aircraft panels and turkey feathers were the two highest contributors. For specific aircraft the F-18 (Turkey Feather and VEN) and P-3 boarding ladder were major contributors to injury.

Fingers and hands were by far the most common injured body parts.

AIRCRAFT COMPONENT	FINGER	HAND	LEG	ARM	HEAD	CHEST	EYE	KNO	Grand Total
PANEL	1	5	2					1	9
UNKNOWN	7	1	1						9
TURKEY FEATHER	3	2						1	6
BOARDING LADDER	4	1							5
ENGINE	3	2							5
FUEL CELL		1	1	2		1			5
VEN	2	2							4
ENGINE EXHAUST	1	3							4
HORIZONTAL STABILIZER	1	2							3
ROTOR HEAD	2				1				3
PYLON	2	1							3
NOSE LANDING GEAR		1					1		2
TAIL ROTOR	1	1							2
HEAT SHIELD	1	1							2
EJECTION SEAT	1	1							2
LANDING GEAR DOOR	1	1							2
ENGINE BAY DOOR	1	1							2
COTTER PIN		1		1					2
FLAP	1		1						2
FUSELAGE	2								2
BRACKET	1	1							2
CREW DOOR		1		1					2
FUEL TANK		1	1						2
GENERATOR		2							2

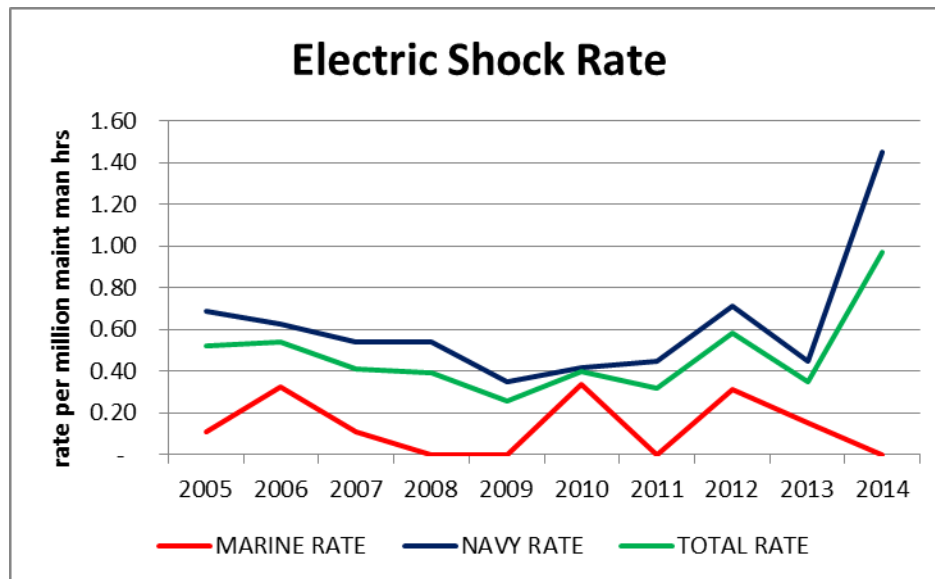
**Table E-3: Aircraft Component vs Body Part (FY05 Though 31 March 2014)**

## APPENDIX F: ELECTRIC SHOCK

Table F-1 displays the number of injuries from electric shock. Figure F-1 shows the rate of injury.

FY	MARINE	NAVY	Grand Total
2005	1	16	17
2006	3	14	17
2007	1	12	13
2008		11	11
2009		6	6
2010	2	7	9
2011		7	7
2012	2	10	12
2013	1	6	7
2014		8	8
<b>Grand Total</b>	<b>10</b>	<b>97</b>	<b>107</b>

**Table F-1: Electric Shock Injuries (FY05 Through 31 March 2014)**



**Figure F-1: Electric Shock Injury Rate (FY05 Through 31 March 2014)**

From Figure F-1, a spike in the electric shock rate for 2014 can be seen. A closer look at 2014 shows that was caused by F-18 events, primarily from the canopy

T/M/S	DATE	SEVERITY	INJ_CLASSN	AIRCRAFT COMPONENT
F018E	3/16/2014	H	NO INJURY OR ILLNESS	CANOPY
F018E	3/12/2014	H	NO INJURY OR ILLNESS	CANOPY
F018F	2/11/2014	H	OTHER REPORTABLE	CANOPY
F018F	2/7/2014	H	NO INJURY OR ILLNESS	UNKNOWN
P008A	1/29/2014	H	NO INJURY OR ILLNESS	UNKNOWN
F018F	10/28/2013	H	NO INJURY OR ILLNESS	ARS PANEL CANNON PLUG
F018C	10/28/2013	H	OTHER REPORTABLE	CANOPY
F018F	10/2/2013	H	NO INJURY OR ILLNESS	UNKNOWN

**Table F-2: FY 2014 Electric Shocks**

Table F-3 displays the T/M/S vs the involved aircraft component for electric shocks. In 34% of the events, the aircraft component could not be determined. For the events where the component was identified, the F-18 canopy had the highest number of occurrences.

AIRCRAFT COMPONENT	F-18	P-3	EA-6B	E-6	H-60	C-2	AH-1	P-8	H-53	F-14	E-2	S-3	UNK	Grand Total
UNKNOWN	7	9	2	8	4	1	1	2	1		1		1	37
CANOPY	18													18
POWER CABLE	4	1	5		1									11
RADIO			3											3
BATTERY	1					1								2
BLADE FOLD TEST KIT					2									2
FORWARD ELECTRICAL LOAD CENTER		1												1
MAIN FUEL TANK GAUGE													1	1
INDUCER VALVE													1	1
ARC-94													1	1
ANCILLARY DISPLAY UNIT													1	1
ARS PANEL CANNON PLUG	1													1
HEATER									1					1
AVIATION COMPONENT													1	1
LOX INDICATOR	1													1
AVIONICS COOLING FAN CANON PLUG												1		1
AIRCRAFT LIGHT													1	1
AVIONICS GEAR													1	1
(blank)					1									1
AWM-103 TEST SET	1													1
FUEL BOOST PUMP							1							1
APN-195 RECEIVER TRANSMITTER													1	1
ICS		1												1
KAPTON WIRING						1								1
APS-115 RECEIVER/TRANSMITTER													1	1
LAU-7													1	1
LIGHT BULB				1										1
BOARDING LADDER	1													1
M-197 CANNON							1							1
ACCUMULATOR PUMP SWITCH													1	1
PITCH LOCK ACTUATOR													1	1
RADAR COOLING PUMP SWITCH										1				1
RADAR CONNECTOR PIN			1											1
UHF FILTER FAN MOUNT				1										1
AFCS CANON PLUG													1	1
ECS TEMPERATURE FLOW CONTROLLER	1													1
UN-BIAS AMPLIFIER		1												1
EJECTION SEAT			1											1
WIRE													1	1
ELECTRONICS BAY										1				1
A/M32A-108 MEPP cord					1									1
ELECTRONICS RELAY				1										1
<b>Grand Total</b>	<b>35</b>	<b>13</b>	<b>12</b>	<b>11</b>	<b>9</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>15</b>	<b>109</b>

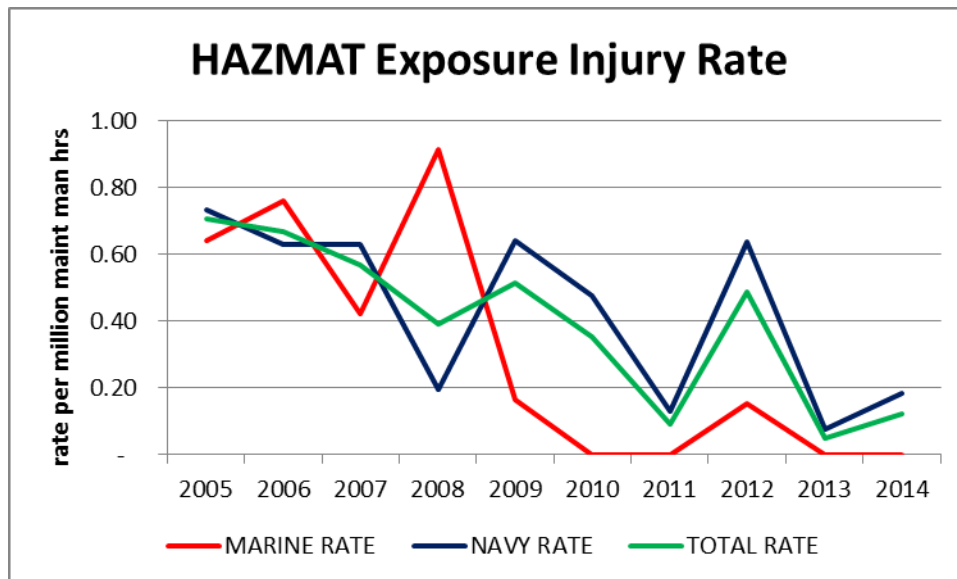
**Table F-3: Electric Shock T/M/S vs Aircraft Component**

## APPENDIX G: HAZMAT

Table G-1 displays the number of injuries from Hazardous Materials. Figure G-1 shows the rate of injury. The Marines have had only 1 event since 2009.

FY	MARINE	NAVY	Grand Total
2005	6	17	23
2006	7	14	21
2007	4	14	18
2008	7	4	11
2009	1	11	12
2010		8	8
2011		2	2
2012	1	9	10
2013		1	1
2014		1	1
<b>Grand Total</b>	<b>26</b>	<b>81</b>	<b>107</b>

**Table G-1: Hazardous Material Injuries (FY 05 Through 31 March 2014)**



**Figure G-1: Hazardous Material Injury Rate (FY 05 Through 31 March 2014)**

Table G-2 displays the hazardous material along with the affected body part. Fuel, cleaning compound and hydraulic fluid were the leading hazardous materials. 54% of the injuries involved hazmat exposure to the mouth.

HAZARDOUS MATERIAL	EYE	MOUTH	HEAD	BODY	FOOT	HAND	SHOULDER	PELVIS	ARM	CHEST	EAR	UNK	Grand Total
FUEL	23	2	2	3	3	2	2	1		1	1	6	46
CLEANING COMPOUND	16	1	2			1			1			2	23
HYDRAULIC FLUID	16		4									3	23
HALON		8										1	9
SEA DYE MARKER												2	2
UNKNOWN	1												1
PAINT	1												1
BATTERY ACID			1										1
AFFF	1												1
FIRE EXTINGUISHING AGENT												1	1
<b>Grand Total</b>	<b>58</b>	<b>11</b>	<b>9</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>12</b>	<b>108</b>

**Table G-2: Hazardous Material Injuries By Body Part (FY05 Through 31 March 2014)**

Table G-3 lists the hazmat by T/M/S. It's interesting to note the high occurrence of EA-6B fuel exposure given the relatively small numbers of EA-6B airframes.

HAZARDOUS MATERIAL	EA-6B	P-3	H-60	H-53	F-18	V-22	C-2	E-2	AV-8B	AH-1	S-3	E-6	C-130	P-8	C-40	UNK	Grand Total
FUEL	10	7	4	2	7			1	1	2	2		1			9	46
CLEANING COMPOUND	3	4	7	2			2							1		4	23
HYDRAULIC FLUID	4	5	3	4			1	2	1						1	2	23
HALON	1			2		5										1	9
SEA DYE MARKER																2	2
UNKNOWN				1													1
PAINT												1					1
BATTERY ACID																1	1
AFFF																1	1
FIRE EXTINGUISHING AGENT		1															1
<b>Grand Total</b>	<b>18</b>	<b>17</b>	<b>14</b>	<b>11</b>	<b>7</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>20</b>	<b>108</b>

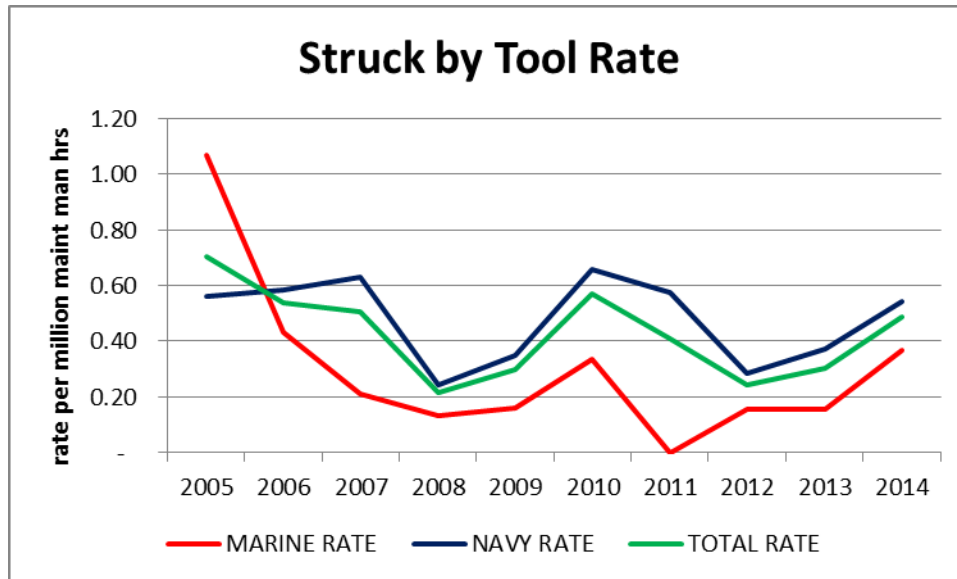
**Table G-3: Hazardous Material Injuries By T/M/S (FY05 Through 31 March 2014)**

## APPENDIX H: STRUCK BY TOOL

Table H-1 displays the number of injuries resulting from being struck by a tool. Figure H-1 shows the rate of injury.

FY	MARINE	NAVY	Grand Total
2005	10	13	23
2006	4	13	17
2007	2	14	16
2008	1	5	6
2009	1	6	7
2010	2	11	13
2011		9	9
2012	1	4	5
2013	1	5	6
2014	1	3	4
Grand Total	23	83	106

**Table H-1: Struck By Tool Injuries (FY05 Through 31 March 2014)**



**Figure H-1: Struck By Tool Injury Rate (FY05 Through 31 March 2014)**

Table H-2 displays the type of tool that was used vs the T/M/S. Wrenches, razors and hammers were the top three tools. Note that 34% of the injury events had no tool described in the narrative. Individually, speed handles in the F-18 community had the highest occurrence.

TOOL	F-18	P-3	H-60	EA-6B	C-130	AV-8B	AH-1	E-2	H-53	E-6	P-8	V-22	S-3	UNK	Grand Total
WRENCH	1	3	2	2	1	1			1			1		4	16
RAZOR	2	2				1								6	11
HAMMER	1	1				1		1						7	11
SAFETY WIRE	1			1			1			1	1			2	7
SPEED HANLE	6	1													7
KNIFE					2									4	6
SCREW DRIVER		2	3											1	6
UNKNOWN							1							5	6
DRILL	1	1		1										2	5
SPEED HANDLE	2														2
SANDER								1						1	2
COTTER PIN	1		1												2
CRANK	2														2
RATCHET		1											1		2
PLIERS					1									1	2
PUNCH	1			1											2
BLADE CLAMP			2												2
(blank)		1													1
JACK		1													1
SWAGE TOOL				1											1
SCIBE	1														1
VIBE ABSORBER			1												1
PNEUMATIC SWAGING TOOL														1	1
STAND/LADDER								1							1
SCREWDRIVER	1														1
DRILL BIT														1	1
SCRIBE							1								1
SEALANT REMOVAL TOOL									1						1
WIRE BRUSH			1												1
RESTRAINT BAR			1												1
AWL														1	1
SAFETY STRAP		1													1
<b>Grand Total</b>	<b>20</b>	<b>14</b>	<b>11</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>36</b>	<b>106</b>

**Table H-2: T/M/S vs Type of Tool  
(Struck By Tool From FY05 Through 31 March 2014)**

Table H-3 lists the type of tool vs the injured body part.

TOOL	FINGER	HEAD	HAND	EYE	LEG	ARM	UNK	Grand Total
WRENCH	1	9	3	3				16
RAZOR	9		2					11
HAMMER	3	3	4		1			11
SAFETY WIRE	5	1		1				7
SPEED HANLE		2		5				7
KNIFE	3		1		1	1		6
SCREW DRIVER	1	2	2	1				6
UNKNOWN	4			1			1	6
DRILL	2	1	2					5
SPEED HANDLE				2				2
SANDER			2					2
COTTER PIN	1		1					2
CRANK		2						2
RATCHET		1		1				2
PLIERS	1			1				2
PUNCH		1	1					2
BLADE CLAMP		1					1	2
(blank)							1	1
JACK	1							1
SWAGE TOOL	1							1
SCIBE	1							1
VIBE ABSORBER		1						1
PNEUMATIC SWAGING TOOL	1							1
STAND/LADDER						1		1
SCREWDRIVER					1			1
DRILL BIT	1							1
SCRIBE				1				1
SEALANT REMOVAL TOOL			1					1
WIRE BRUSH				1				1
RESTRAINT BAR	1							1
AWL			1					1
SAFETY STRAP		1						1
<b>Grand Total</b>	<b>36</b>	<b>25</b>	<b>20</b>	<b>17</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>106</b>

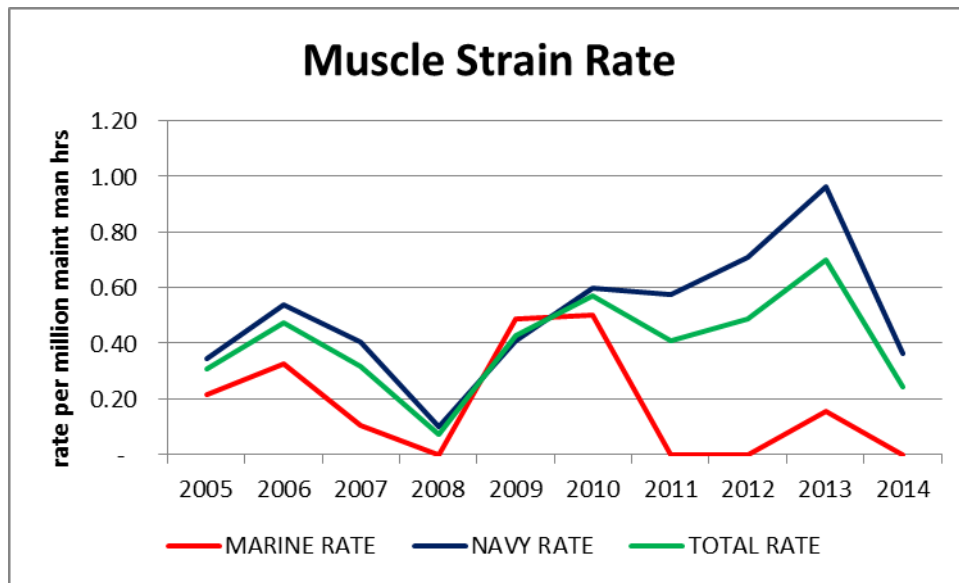
**Table H-3: Type of Tool vs Injured Body Part**

## APPENDIX I: MUSCLE STRAIN

Table I-1 displays the number of muscle strain injuries. Figure I-1 shows the rate of injury. Table I-2 lists the T/M/S vs the strained body part. 58% of the injuries did not list an aircraft.

FY	MARINE	NAVY	Grand Total
2005	2	8	10
2006	3	12	15
2007	1	9	10
2008		2	2
2009	3	7	10
2010	3	10	13
2011		9	9
2012		10	10
2013	1	13	14
2014		2	2
<b>Grand Total</b>	<b>13</b>	<b>82</b>	<b>95</b>

**Table I-1: Muscle Strain Injuries (FY05 Through 31 March 2014)**



**Table I-1: Muscle Strain Injury Rate (FY05 Through 31 March 2014)**

T/M/S	BACK	SHOULDER	KNEE	ARM	ANKLE	STOMACH	HAND	NECK	LEG	CHEST	RIB	Grand Total
UNKNOWN	18	11	6	7		4	3	2	2	1	2	56
F-18	6	5	2	1				1				15
H-60	4	1			1	1	1					8
H-53	1	1	2		1							5
EA-6B	1		1		2							4
AV-8B					1		1					2
E-6			1							1		2
AH-1	1											1
P-3								1				1
S-3	1											1
C-2				1								1
<b>Grand Total</b>	<b>32</b>	<b>18</b>	<b>12</b>	<b>9</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>96</b>

**Table I-2: Muscle Strain Injuries by T/M/S and Injured Body Part  
(FY05 Through 31 March 2014)**

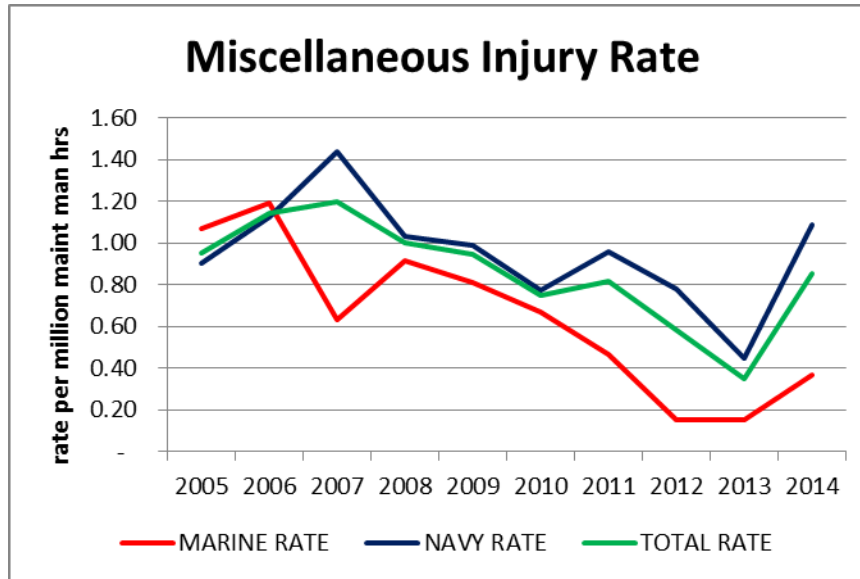
## APPENDIX J: ALL OTHER INJURIES

Appendix J combines all of the remaining injuries. The injury type reflecting in this appendix include ammunition discharge, burns, CADS/Flare release, crunched by panel/bay/canopy, dropped MER/ordnance/drop tank, hit by wave, insect bite, jet blast/prop-rotor wash, laceration, lightning strike, object in eye, smoke inhalation, struck by moving aircraft and miscellaneous. These were all combined because individually, there were only a few injuries for each injury type. Combined, Appendix J injuries accounted for only 16% of the total aviation maintenance injuries.

Table J-1 displays the number of injuries. Figure J-1 shows the rate of injury. Table J-2 lists the T/M/S vs the injured body part. 34% of the injuries did not list an injured body part.

FY	MARINE	NAVY	Grand Total
2005	10	21	31
2006	11	25	36
2007	6	32	38
2008	7	21	28
2009	5	17	22
2010	4	13	17
2011	3	15	18
2012	1	11	12
2013	1	6	7
2014	1	6	7
Grand Total	49	167	216

**Table J-1: Miscellaneous Injuries (FY05 Through 31 March 2014)**



**Figure J-1: Miscellaneous Injury Rate (FY05 Through 31 March 2014)**

T/M/S	HAND	FINGER	EYE	LEG	HEAD	FOOT	ARM	MULTIPLE BODY PARTS	BACK	PELVIS	SHOULDER	RIBS	KNEE	UNK	Grand Total
F-18	12	3	2	8	4	4	6	1	2		1		1	27	71
UNKOWN	4	5	2	1		1	2							10	25
H-60	4	2	4	2		3		1		1				5	22
P-3	2	5	4		2	1	1							5	20
EA-6B	7	2	1		2							1		5	18
AV-8B	1	3	1	1	2									3	11
H-53	4		2	2										3	11
V-22	2	1	1		1									3	8
AH-1			3			1								2	6
C-2		1		1										3	5
P-8		1	1	1	1									1	5
C-130		2	1											1	4
H-46		1												3	4
E-6		1	2		1									0	4
E-2	1			1										2	4
S-3	2													1	3
C-40		1												1	2
C-9		1												0	1
F-14														1	1
Grand Total	39	29	24	17	13	10	9	2	2	1	1	1	1	76	225

**Table J-2: Miscellaneous T/M/S vs Body Part (FY05 Through 31 March 2014)**